# USER'S MANUAL

# Profibus DP Fieldbus Option Board

# SV9000 AF Drive

Subject to changes without notice

**INDEX**

# 1. GENERAL

SV9000 drives can be connected to the Profibus DP using the SV9NCPB fieldbus board. The drive can then be controlled, monitored and programmed from the Host system.

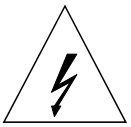
The fieldbus board can also extend the used I/O:

- 4 digital inputs (standard signals)
- 4 digital outputs (2 standard signal)
- 1 relay output (standard signal)
- thermistor input (can be directly connected to the motor thermistors for overtemperature trip)
- Encoder input

The fieldbus board can be installed in the existing option board location inside the drive. For the Compact Nema 1 range the option kit SV9NCPBCN is needed.

The control connections are isolated from the utility potential and the I/O ground is connected to the frame of the device via a 1 MΩ resistor and 4.7 nF capacitor *. The control I/O ground can be connected also directly to the frame by changing the position of the jumper X9 (GND ON/OFF) to ON-position. Digital inputs are also isolated from the I/O ground.

**NOTE !**



*Internal components and circuit boards (except the isolated I/O terminals) are at utility potential when the drive is connected to the utility. This voltage is extremely dangerous and may cause death or severe injury if you come in contact with it.*

*The control I/O terminals are isolated from the utility potential, but the I/O's (if jumper X9 is in OFF position) may have a dangerous voltage connected even if the power is off on the drive.*

* Default value (X9 is GND OFF position)

# 2. SPECIFICATIONS

## 2.1 General

| | | |
|---|---|---|
| **Profibus DP - connections** | Interface | 9-pin DSUB connector (female) |
| | Transfer method | RS-485, Half duplex |
| | Transfer cable | Twisted pair (1 pair and shield) |
| | Electrical isolation | 500 V DC |
| | | |
| **I/O -control connections** | Digital input (4 pcs) | 24 V: "0" ≤10 V, "1" ≥18 V, $R_i$ = 5 kΩ |
| | Digital output (4 pcs) | Open collector output, 50 mA/48 V |
| | Relay output (1 pcs) | Max.switching voltage: 300 V DC, 250 V AC<br>Max.switching load: 8 A / 24 V DC<br>0,4 A / 300 V AV<br>2 kVA / 250 V DC<br>Max.continuous load: 2 A rms |
| | Termistor input (1 pcs) | $R_{trip}$ = 4.7 kΩ |
| | Encoder input (3 pcs) | 24 V: "0" ≤10 V, "1" ≥18 V, $R_i$ = 3.3 kΩ<br>5 V : "0" ≤2 V, "1" ≥3 V, $R_i$ = 330 Ω |
| | Aux. voltage | 24 V (±20%), max 50 mA |
| **Safety** | | Fulfils EN50178 standard |

| | | |
|---|---|---|
| **Communication mode** | Profibus DP | |
| **PPO types** | 1<br>2<br>3<br>4 | |
| **Communication parameters**<br>**-** Address<br>- Baud Rate | <br>1 to 127<br>9.6 kBaud to 12 MBaud | |

**Table 2-1. Profibus communication data**

## 2.2 Profibus cable

Profibus devices are connected in a bus structure. Up to 32 stations (master or slaves) can be connected in one segment. The bus is terminated by an active bus terminator at the beginning and end of each segment (see figure 2-1). To ensure error-free operation, both bus terminations must always be powered. When more than 32 stations are used, repeaters (line amplifiers) must be used to connect the individual bus segments.
The maximum cable length depends on the transmission speed and cable type (see table 2-4). The specified cable length can be increased by the use of repeaters. The use of more than 3 repeaters in series is not recommended.

| Parameter | Line A | Line B |
|---|---|---|
| **Impedance** | 135 ... 165 Ω (3 to 20 MHz) | 100 ... 130 Ω ( f > 100kHz) |
| **Capacity** | < 30 pF/m | < 60 pF/m |
| **Resistance** | < 110 Ω / km | - |
| **Wire gauge** | > 0,64 mm | > 0,53 mm |
| **Conductor area** | > 0,34 $mm^2$ | > 0,22 $mm^2$ |

**Table 2-1 Line Parameter**

| Baud rate (kbit/s) | 9.6 | 19.2 | 93.75 | 187.5 | 500 | 1500 | 3000-12000 |
|---|---|---|---|---|---|---|---|
| Length line A (m) | 1200 | 1200 | 1200 | 1000 | 400 | 200 | 100 |
| Length line B (m) | 1200 | 1200 | 1200 | 600 | 200 | - | - |

**Table 2-2 Line length for different transmission speeds**

Following cables can be used (e.g):

| | | |
|---|---|---|
| Belden | Profibus Data Cable | 3079A |
| Olflex | Profibus Cable | 21702xx |
| Siemens | SINEC L2 LAN cable for Profibus | 6XV1 830-0AH10 |

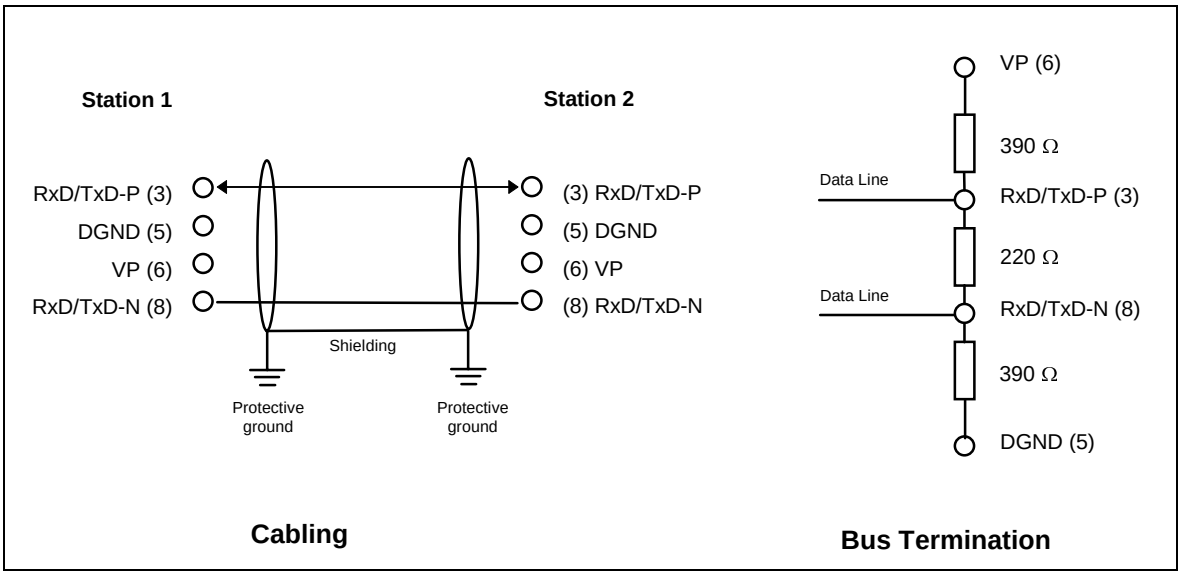



**Figure 2-1 Cabling and bus termination**

# 3. PROFIBUS DP

## 3.1 General

PROFIBUS is a vendor-independent, open fieldbus standard for a wide range of applications in manufacturing, process and building automation. Vendor independence and openness are guaranteed by the PROFIBUS standard EN 50 170. With PROFIBUS, devices of different manufacturers can communicate without special interface adjustments. PROFIBUS can be used for both high-speed time critical data transmission and extensive complex communication tasks. The PROFIBUS family consists of three compatible versions.

PROFIBUS-DP

Optimized for high speed and inexpensive hookup, this PROFIBUS version is designed especially for communication between automation control systems and distributed I/O at the device level. PROFIBUS-DP can be used to replace parallel signal transmission with 24 V or 0 to 20 mA.

PROFIBUS-PA

PROFIBUS-PA is designed especially for process automation. It permits sensors and actuators to be connected on one common bus line even in intrinsically safe areas. PROFIBUS-PA permits data communication and power over the bus using a 2-wire technology according to the international standard IEC 1158-2.

PROFIBUS-FMS

PROFIBUS-FMS is the general-purpose solution for communication tasks at the cell level. Powerful FMS services open up a wide range of applications and provide great flexibility. PROFIBUS-FMS can also be used for extensive and complex communication tasks.

PROFIBUS specifies the technical and functional characteristics of a serial fieldbus system with which decentralized digital controllers can be networked together from the field level to the cell level. PROFIBUS distinguishes between master devices and slave devices.

Master devices determine the data communication on the bus. A master can send messages without an external request when it holds the bus access rights (the token). Masters are also called active stations in the PROFIBUS protocol.

Slave devices are peripheral devices. Typical slave devices include input/output devices, valves, drives and measuring transmitters. They do not have bus access rights and they can only acknowledge received messages or send messages to the master when requested to do so. Slaves are also called passive stations.

## 3.2 Profiles

The PROFIBUS-DP protocol defines how user data are to be transmitted between the stations over the bus. User data are not evaluated by the PROFIBUS-DP transmission protocol. The meaning is specified in the profiles. In addition, the profiles specify how PROFIBUS-DP is to be used in the application area. The following PROFIBUS-DP profile is used in SV9000 Profibus fieldbus board.

Variable-Speed Drive Profile (3.071)
Leading manufacturers of drive technology have jointly defined the PROFIDRIVE profile. The profile specifies how the drives are to be parameterized and how the setpoints and actual values are to be transmitted. This enables drives from different vendors to be exchanged. The profile contains the necessary specifications for speed control and positioning. It specifies the basic drive functions while leaving sufficient freedom for application-specific expansions and further developments. The profile describes the mapping of the application functions for DP or FMS.

# 4. INSTALLATION

Before starting the installation, carefully read the safety instructions in the " SV9000 Drive User's Manual" chapter "SAFETY". Check that you have received all the Fieldbus board parts: Fieldbus board, plastic board, power cable (black terminal), data cable (blue terminal) and grounding screw.
The fieldbus board can be placed in the existing place for an option board inside the drive (see figure 4-1).

| | |
|---|---|
| **A** | Remove the control panel and the jumper X4 from the control board (**1**). |
| **B** | Connect the power cable to control board terminal X5 (**2**) and the data cable to terminal X14 (**3**). The power cable can also be connected to terminal X6, if the power cable from the power board is connected to terminal X5. |
| **C** | Bend the data cable into an "S-curve" as far as possible from the power board transformer (**4**) before you place the plastic board onto the control board. |
| **D** | Remove the protection foil of the plastic board and mount the plastic board on the control board. Check the right position of the plastic board (**5**). |
| **E** | Place the Fieldbus board above the plastic board by the larger holes and push it downward so that the narrow part of the hole in the board fits the cut on the sleeve. Check that the installation is stable. If you have difficulties in placing the plastic board and Fieldbus board, slightly bend regulator A4 (**6**) and capacitor C59 (**7**) of the control board. |
| **F** | Connect the power cable to terminal X6 of the Fieldbus board (**8**) and the data cable to terminal X14 (**9**). |
| **G** | Install the jumper you removed from terminal X4 of the control board, on the X9 -terminal of the Fieldbus board (**10**) in the ON or OFF position. |
| **H** | If the packet includes the cable cover (**11**), install it into position as shown in figure 4-1. |
| **I** | Install the grounding screw (**12**). |
| **J** | After this install the control panel and connect the needed control signals. |

| | |
|---|---|
| **K** | If a 5 V encoder input is used, install the jumper on terminal X7 (see figure 5-1) of the Fieldbus board. |

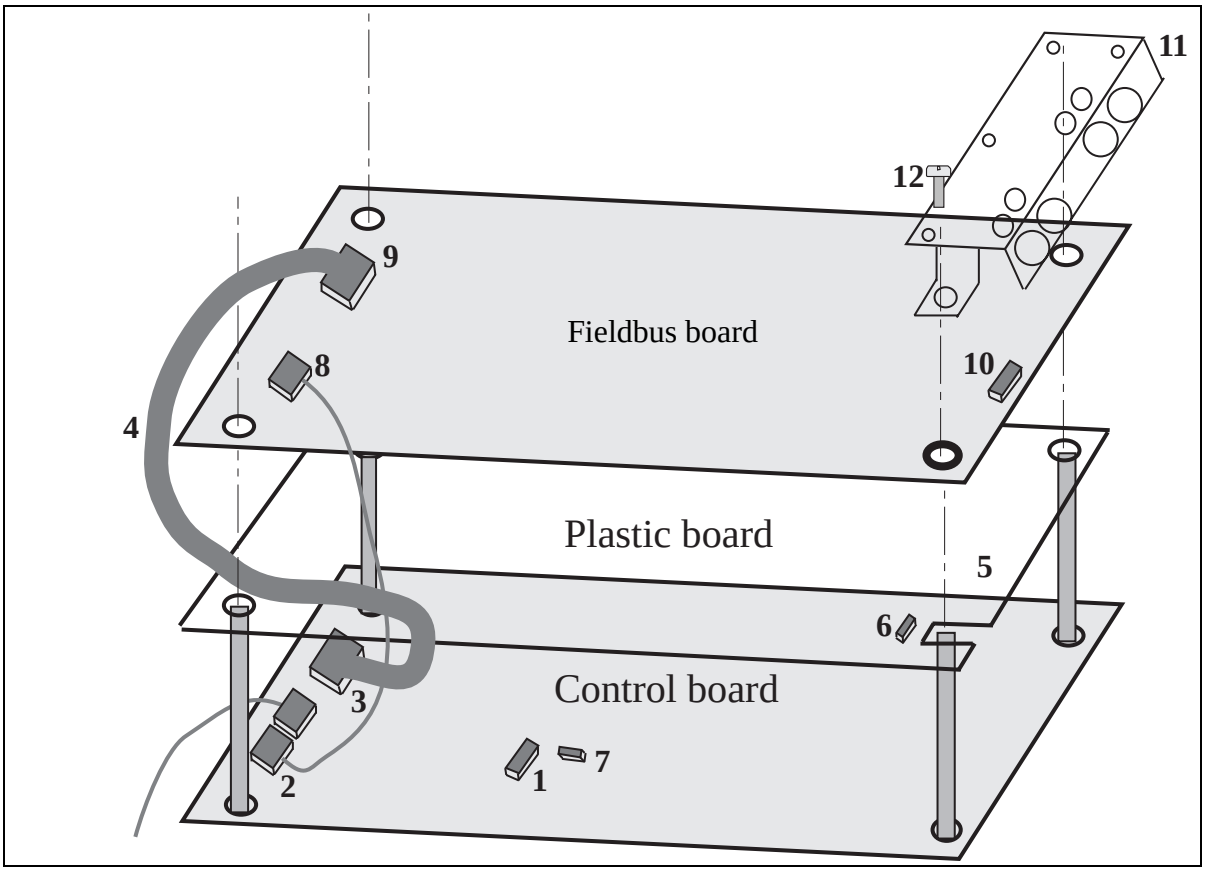



**Figure 4-1. Fieldbus board installed into the control board**

# 5. CONNECTIONS

## 5.1 Board layout

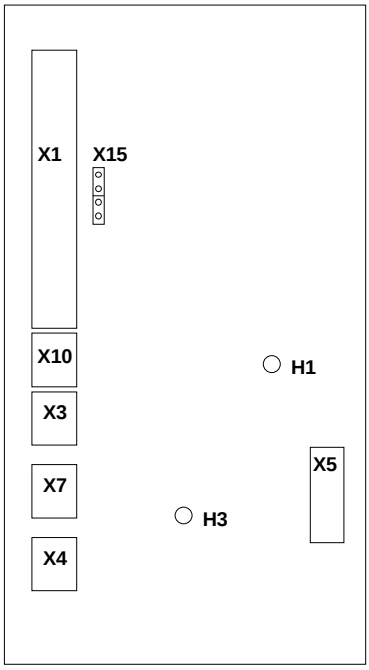



**Figure 5-1. Fieldbus board**

Terminals:

| | |
|---|---|
| X1 | I/O - terminals |
| X10 | Digital Output terminal |
| X3 | Digital Output terminal |
| X7 | Relay Output terminal |
| X4 | thermistor input |
| X15 | Encoder terminal |
| X5 | Screw terminal to Profibus DP |
| X9 | Connection of control I/O ground:<br>ON - Directly to the frame of the device<br>OFF- To the frame of the device via RC filter |
| X17 | Connection of control Fieldbus cable shield:<br>ON - Directly to the frame of the device<br>OFF- To the frame of the device via RC filter |

Diagnostic LED:

| | |
|---|---|
| H1 | Data Exchange state for Profibus DP, Red<br>H1 led is active when Fieldbus board is not ready to exchange data |
| H3 | Supply Voltage, Green.<br>H3 led is active if the Fieldbus board has a supply voltage. |

## 5.2 Profibus connections

Screw Connector X5:

| Signal | Connector X5 | Description |
|---|---|---|
| Shield | X5-241 | Cable shield |
| VP | X5-242 | Supply voltage of the terminating resistance |
| RxD/TxD-P | X5-243 | Receive/Transmission data positive (B) |
| RxD/TxD-N | X5-244 | Receive/Transmission data negative (A) |
| DGND | X5-245 | Data Ground |

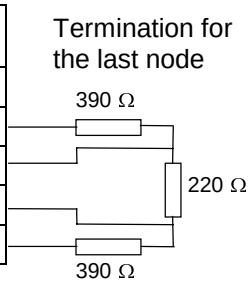
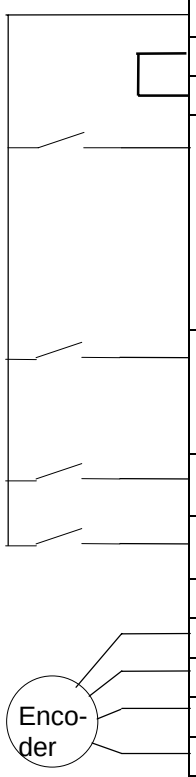



**Table 5-1. D-sub connector**

**Note!** If the SV9000 is the last device then the bus termination must be set. Install the resistors to the screw terminal (see table 5-1)

## 5.3 I/O-control connections




| Terminal | | Signal | Description |
|---|---|---|---|
| 206 | +24 V | Control voltage output | Voltage for switches, etc. max. 0.05 A |
| 207 | GND | I/O ground | Ground for reference and controls |
| 208 | COME | Common for DIE1-DIE4 | Connect to GND or +24 V |
| 209 | DIE1 | Programmable:<br>External fault<br><br>OR<br><br>Select of Active Control Source | <br>Contact open = no fault<br>Contact closed = fault<br><br><br>Contact open = SV9000 IO-terminal<br>Contact closed = Fieldbus |
| 210 | DIE2 | Run disable | Contact open = start of motor enabled<br>Contact closed = start of motor disabled |
| 211 | DIE3 | Acceler. / Decel. time selection | Contact open = time 1 selected<br>Contact closed = time 2 selected |
| 212 | DIE4 | Jogging speed selection | Contact open = no action<br>Contact closed = jogging speed |
| 213 | | | Not Used |
| 214 | DIE6A+ | Pulse input A | |
| 215 | DIE6A- | (differential input) | |
| 216 | DIE7B+ | Pulse input B | 90 degrees phase shift compared |
| 217 | DIE7B- | (differential input) | to pulse input A |
| 218 | DOE1 | Encoder direction output | |
| 219 | DOE2 | Encoder divider 1/64 output | |
| 220 | | | Not Used |
| 221 | TI+ | Termistor input | |
| 222 | TI- | | |
| 225 | RO4/1 | | Relay output 4, FAULT |
| 226 | RO4/2 | | |
| 231 | DOE3 | Open collector output 3 | READY |
| 232 | GND | I/O ground | Ground for reference and controls |
| 233 | DOE4 | Open collector output 4 | RUN |
| 234 | GND | I/O ground | Ground for reference and controls |

**Figure 5-2. Control connections**

**NOTE!** Thermistor input (Terminals 221 and 222) must be shorted if not used

READY = ON, when the utility voltage has been applied and the SV9000 is ready to operate
RUN = ON, when the motor is running
FAULT = ON, if a fault occurs

# 6. COMMISSIONING

First read how to commission the drive in the SV9000 Drive User's Manual (Chapter 8.)

**Commissioning of the Fieldbus board:**

Check that Fieldbus Application is selected.
- Parameter P0.1 = 0 (Fieldbus Appl)

**Start-up test:**

DRIVE APPLICATION

1. Check that the control panel is not the active control source. (See SV9000 Drive User's manual, Chapter 7.)
2. Set parameter Fieldbus control (P9.1) to value 1 (On).

MASTER SOFTWARE

1. Write to Control Word value 0hex.
2. Write to Control Word value 47Fhex.
3. Drive status is RUN
4. Write to Reference value 5000 (=50,00%).
5. Actual is 5000 and drive output frequency is 25,00 Hz
6. Write to Control Word value 7Dhex.
7. Drive status is STOP

*If Status Word bit 3 = 1 Status of drive is FAULT.*

# 7. PROFIBUS SV9000 INTERFACE

Features of the Profibus SV9000 interface:

- Direct control of SV9000 ( e.g. Run, Stop, Direction, Speed reference, Fault reset)
- Full access to all SV9000 parameters
- Monitor SV9000 status (e.g. Output frequency, Output current, Fault code ..)

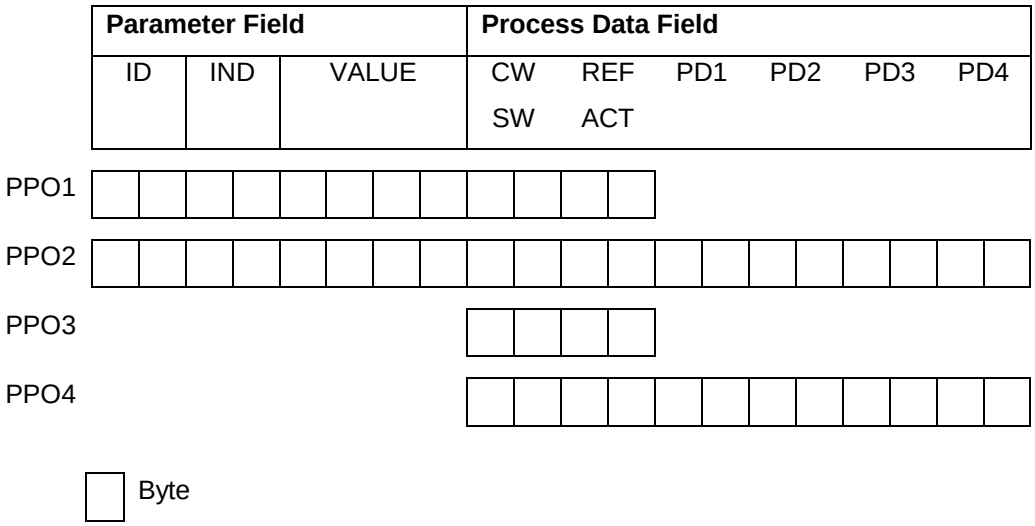
## 7.1 General

Data transfer between Profibus DP master and slave takes place via the Input/Output data field. The master writes to slave's Output data and the slave answers by sending the contents of its Input data to the master. The contents of Input /Output data is defined in the device profile, PROFIDRIVE is the device profile for drives.

The SV9000 drive can be controlled by the Profibus DP master using PPO-types defined in PROFIDRIVE (see next chapter). When fieldbus has been selected as the drive's active control source, the drive's operation can be controlled from the Profibus DP master. Whether or not the active control source is the fieldbus the drive can be monitored and the Profibus DP master can set its parameters.

## 7.2 PPO-types

PPOs (Parameter/Process Data Object) are communication objects in PROFIBUS DP. PPOs in SV9000:




| | |
|---|---|
| ID | Parameter type and number |
| IND | Parameter subindex |
| VALUE | Parameter value |
| CW | Control Word |
| SW | Status Word |
| REF | Reference Value |
| ACT | Actual Value |
| PD | Process Data |

**ID**

| ID byte1 | | | | | | | | ID byte2 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Request/Response type | | | | SM | Parameter Number | | | | | | | | | | |

SM: Spontaneous bit (not used)

Request/Response types

| Request | Function |
|---|---|
| 0 | No request |
| 1 | Read parameter value (word) |
| 2 | Write parameter value (word) |

| Response | Function |
|---|---|
| 0 | No response |
| 1 | Parameter value ready (word) |
| 7 | Request rejected (+fault code) |

Fault Number (if response = 7)

| Fault Number | Description |
|---|---|
| 0 | Illegal Parameter |
| 1 | Parameter is read only ( e.g. actual values) |
| 2 | Parameter value is out of limits |
| 17 | Request temporary reject (e.g. can be change only STOP state) |
| 18 | Other fault |
| 101 | Unknown request type |

***Example1***, (PPO1 mode):

Read parameter number 102 (Par 1.2).

Start drive and set speed reference 50,00%.

Command Master - Slave:

| | | |
|---|---|---|
| ID | 1066 hex | 1 - Read parameter value<br>066 - Parameter 102 (= Maximum frequency ) |
| IND | 0000 hex | 0000 - No meaning |
| VALUE | 0000 0000 hex | 0000 - No meaning |
| CW | 047F hex | 04 7F- Start command (see chapter control word and state machine) |
| REF | 1388 hex | Speed ref. 50,00% (= 25,00 Hz if parameter min. frequency 0 Hz and max. frequency 50 Hz) |

PPO1 frame:

| 10 | 66 | 00 | 00 | 00 | 00 | 00 | 00 | 04 | 7F | 13 | 88 |
|---|---|---|---|---|---|---|---|---|---|---|---|

Answer Slave - Master:

| | | |
|---|---|---|
| ID | 1066 hex | 1 - Parameter value ready |

| | | |
|---|---|---|
| | | 066 - Parameter 102 (= Maximum frequency ) |
| IND | 0000 hex | 0000 - No meaning |
| VALUE | 0000 0032 hex | 0000 0032 - Parameter value = 32hex ( 50 Hz) |
| SW | 0000 hex | 0000 - drive status (see chapter status word and state machine) |
| ACT | 0000 hex | Current speed 0,00% (= 0,00 Hz if parameter min. frequency is 0 Hz and max. frequency 50 Hz) |

PPO1 frame:

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 66 | 00 | 00 | 00 | 00 | 00 | 32 | 00 | 00 | 00 | 00 |

***Example 2***, (PPO1 mode):

Write to parameter number 701 (Par 7.1) value 2.

Keep Run mode on and Send speed reference 75,00%.

Command Master - Slave:

| | | |
|---|---|---|
| ID | 22BD hex | 2 - Write parameter value<br>2BD - Parameter 701 (= Response to reference fault ) |
| IND | 0000 hex | 0000 - No meaning |
| VALUE | 0000 0002 hex | 0000 0002 - Parameter value |
| CW | 047F hex | 04 7F- Start command (see chapter control word and state machine) |
| REF | 1D4C hex | Speed ref. 75,00% (= 37,50 Hz if parameter min. frequency is 0 Hz and max. frequency 50 Hz) |

PPO1 frame:

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | BD | 00 | 00 | 00 | 00 | 00 | 02 | 04 | 7F | 1D | 4C |

Answer Slave - Master:

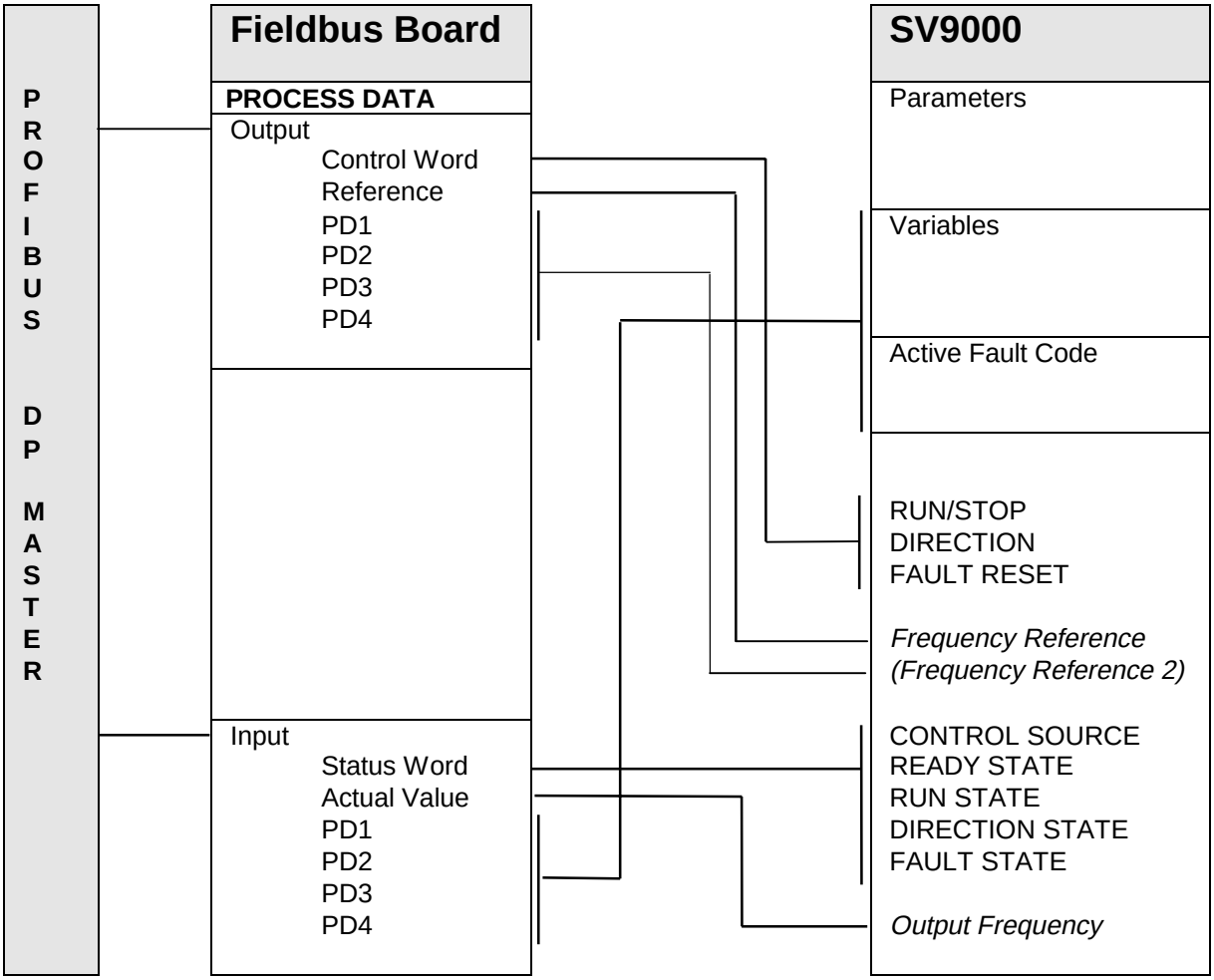
| | | |
|---|---|---|
| ID | 12BD hex | 10 - Parameter value ready<br>2BD - Parameter 701 (= Response to reference fault ) |
| IND | 0000 hex | 0000 - No meaning |
| VALUE | 0000 0032 hex | 0000 0032 - Parameter value = 32HEX ( 50 Hz) |
| SW | 0337 hex | 0337- drive status (see chapter status word and state machine) |
| ACT | 09C4 hex | Current speed 25,00% (= 12,50 Hz if parameter min. frequency is 0 Hz and max. frequency 50 Hz) |

PPO1 frame:

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | BD | 00 | 00 | 00 | 00 | 00 | 00 | 03 | 37 | 09 | C4 |

### 7.3 Process Data

Direct control of SV9000 (e.g. Run, Stop, Direction, Speed reference, Fault reset) and drive status (e.g. Output frequency, Output current, Fault code..) can be handled by using PPO types 1 to 4.


PROFIBUS DP MASTER
Fieldbus Board
PROCESS DATA
Output
Control Word
Reference
PD1
PD2
PD3
PD4
Input
Status Word
Actual Value
PD1
PD2
PD3
PD4
SV9000
Parameters
Variables
Active Fault Code
RUN/STOP
DIRECTION
FAULT RESET
Frequency Reference
(Frequency Reference 2)
CONTROL SOURCE
READY STATE
RUN STATE
DIRECTION STATE
FAULT STATE
Output Frequency

### 7.3.1 Control Word

The Control command for the state machine (see figure 7.1). The state machine describes the device status and the possible control sequence of the drive.
The control word is composed of 16 bits that have the following meanings:

| Bit | Description | |
|---|---|---|
| | Value = 0 | Value = 1 |
| 0 | STOP 1 (by ramp) | ON 1 |
| 1 | STOP 2 (by coast) | ON 2 |
| 2 | STOP 3 (by ramp) | ON 3 |
| 3 | RUN DISABLE | ENABLE |
| 4 | No Action | START |
| 5 | No Action | START |
| 6 | No Action | START |
| 7 | No Action | FAULT RESET (0 -> 1) |
| 8 | No Action | No Action |
| 9 | No Action | No Action |
| 10 | Disable Profibus control | Enable Profibus control |
| 11 | Not used | Not used |
| 12 | Not used | Not used |
| 13 | Not used | Not used |
| 14 | Not used | Not used |
| 15 | Not used | Not used |

### 7.3.2 Status Word

Information about the status of the device and messages is indicated in the status word.
The status word is composed of 16 bits that have the following meanings:

| Bit | Description | |
|---|---|---|
| | Value = 0 | Value = 1 |
| 0 | Not Ready (initial) | READY |
| 1 | Not Ready | READY |
| 2 | DISABLE | ENABLE |
| 3 | NO FAULT | FAULT ACTIVE |
| 4 | STOP 2 OFF | STOP 2 ON |
| 5 | STOP 3 OFF | STOP 3 ON |
| 6 | START ENABLE | START DISABLE |
| 7 | No Warning | Warning |
| 8 | Reference $\neq$ Actual value | Reference = Actual value |
| 9 | Fieldbus control OFF | Fieldbus control ON |
| 10 | Not used | Not used |
| 11 | Not used | Not used |
| 12 | Not used | Not used |
| 13 | Not used | Not used |
| 14 | Not used | Not used |
| 15 | Not used | Not used |

### 7.3.3 State Machine

The state machine describes the device status and the possible control sequence of the drive. Using the "control word" parameter can generate the state transitions. The "status word" parameter indicates the current status of the state machine. The modes ***INIT***, ***STOP***, ***RUN*** and ***FAULT*** (see figure 7-1) correspond to the actual mode of the Drive.

DISABLE (Bit6=1) is one value of the "status word".
Bit0=0 is one value of the "control word".

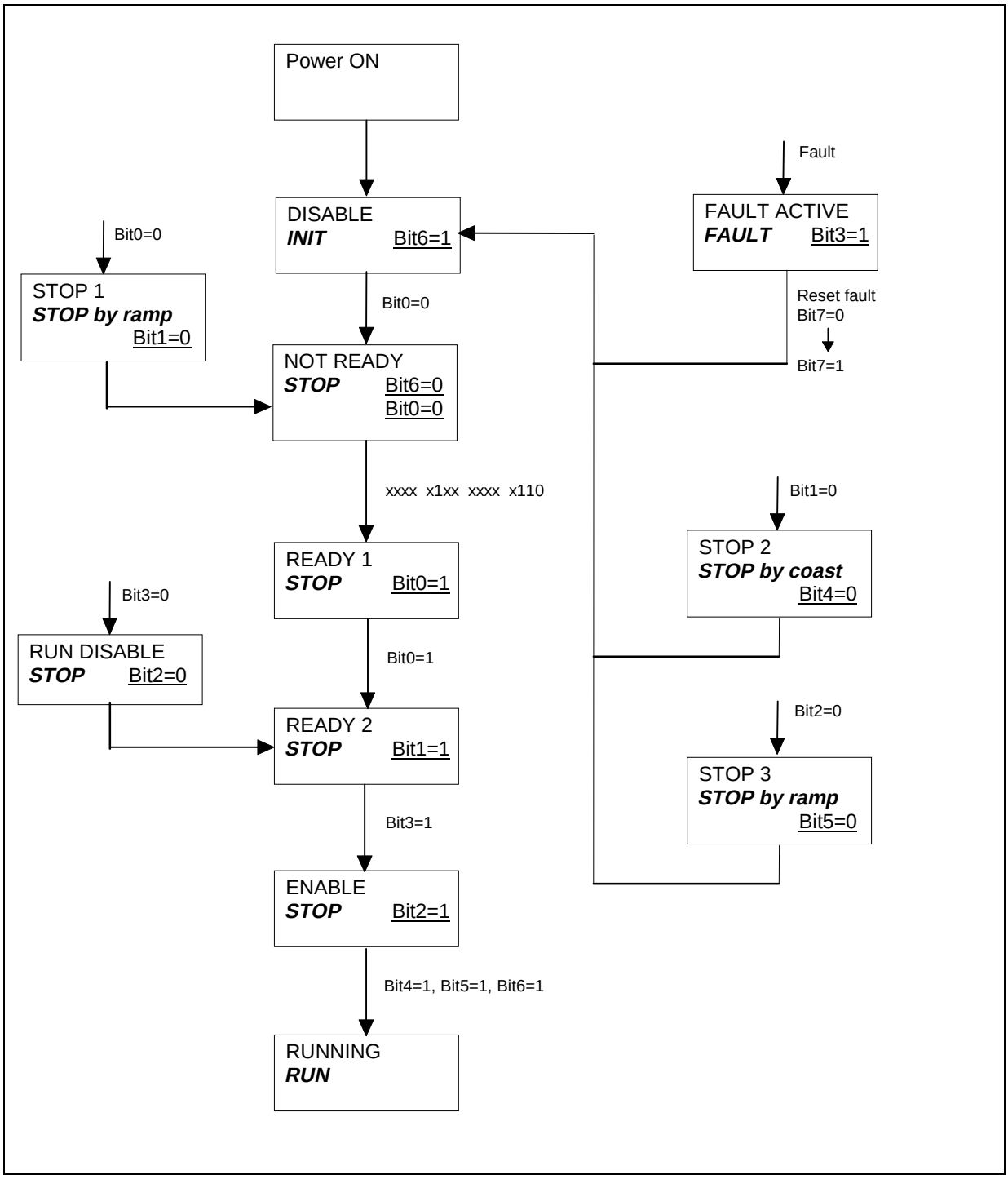



**Figure 7-1. States of the device control**

### 7.3.4 Speed Reference

Speed reference of the drive. The range is -10000... 10000, percentage of frequency area between set minimum and maximum frequency.

| | | | |
|---|---|---|---|
| -10000 | = | 100,00 % | (Direction reverse) |
| 0 | = | 0,00 % | (Direction forward) |
| 10000 | = | 100,00 % | (Direction forward) |

### 7.3.5 Actual Value

Actual value of the motor speed. The range is -10000... 10000, percentage of frequency area between set minimum and maximum frequency.

| | | | |
|---|---|---|---|
| -10000 | = | 100,00 % | (Direction reverse) |
| 0 | = | 0,00 % | (Direction forward) |
| 10000 | = | 100,00 % | (Direction forward) |

### 7.3.6 PD1-PD4

The master can read the drive's actual values by using the process data variables. There are four process data variables and each one of them can be selected to show one of the monitoring page variables or active fault code. Selection can be done in two different ways:

| | | | |
|---|---|---|---|
| By master: | Parameter | 916.1 | PD1 |
| | | 916.2 | PD2 |
| | | 916.3 | PD3 |
| | | 916.4 | PD4 |
| By control panel: | Parameter | Process Data 1 | PD1 |
| | | Process Data 2 | PD2 |
| | | Process Data 3 | PD3 |
| | | Process Data 4 | PD4 |

Set the number of the variable to be monitored (see table 7-1) or number 99 for the active fault code for the value of the parameter.

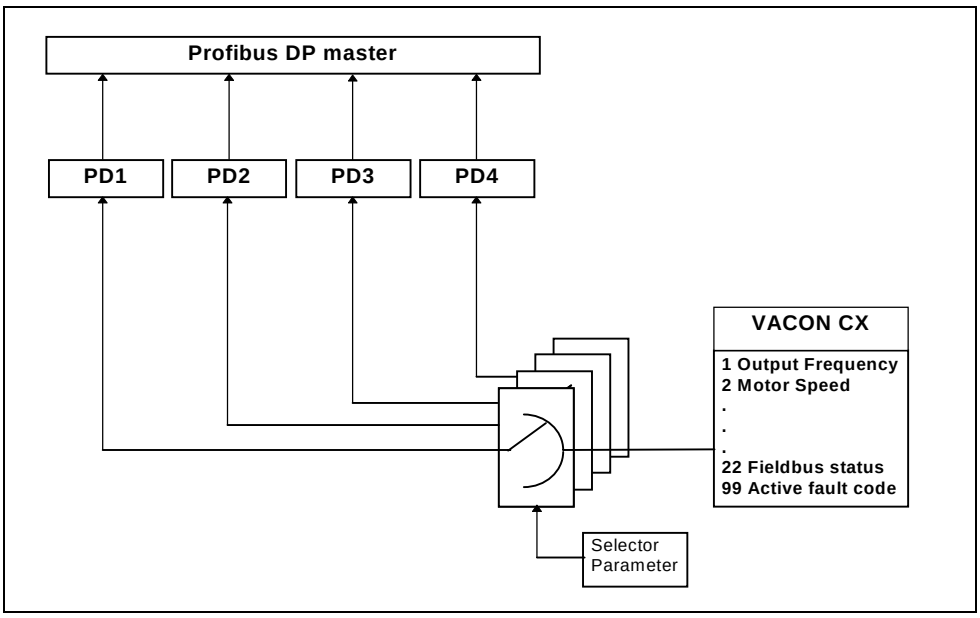
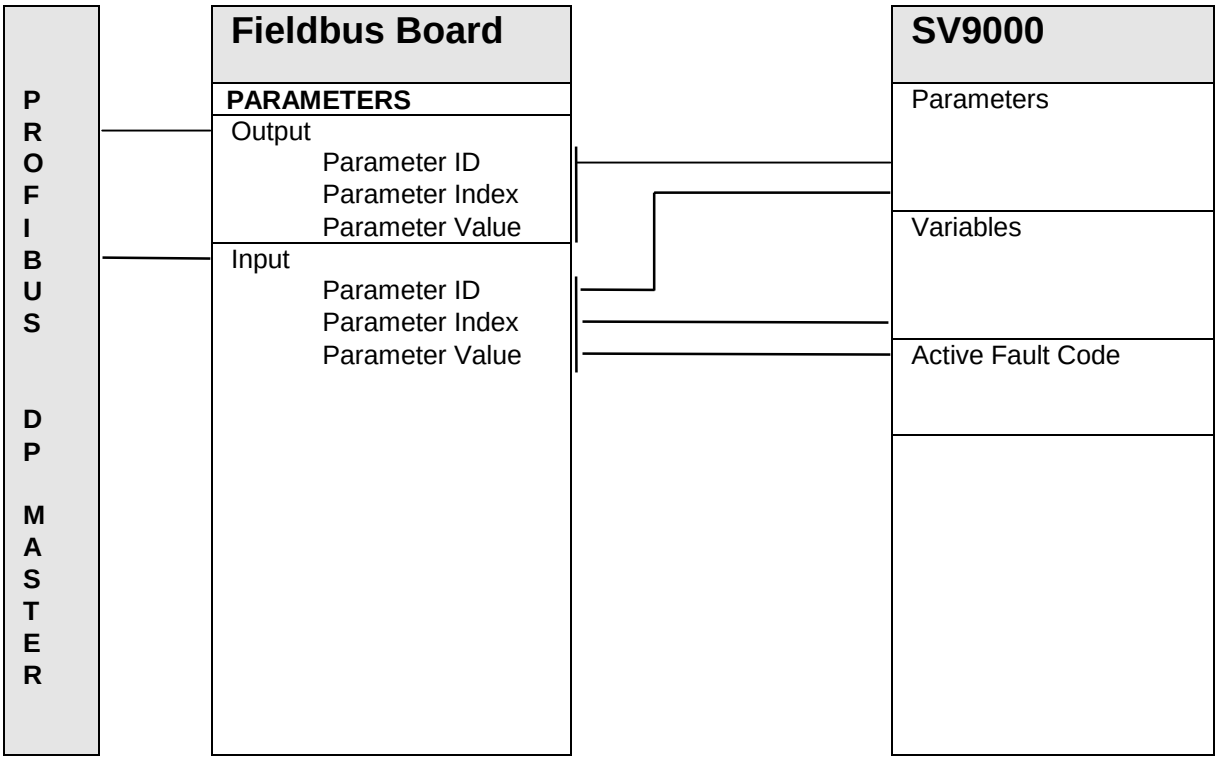



**Figure 7-2. Control of Process Data**

## 7.4 Parameter Data




The SV9000 variables and fault codes can be read and parameters can be read and written by using PPO types 1 and 2.

### 7.4.1 Actual Values

Actual Values can be read by using the Parameter Read function.

Profibus parameter number according to monitored item numbers are as follows.

| Parameter number | SV9000 variable |
|---|---|
| 1 | n1 |
| 2 | n2 |
| . | . |
| . | . |
| 98 | n98 |

| Number | Data name | Step | Unit | Description |
|---|---|---|---|---|
| n1 | Output frequency | 0,01 | Hz | Frequency to the motor |
| n2 | Motor speed | 1 | rpm | Calculated motor speed |
| n3 | Motor current | 0,1 | A | Measured motor current |
| n4 | Motor torque | 1 | % | Calculated actual torque/nominal torque of the unit |
| n5 | Motor power | 1 | % | Calculated actual power/nominal power of the unit |
| n6 | Motor voltage | 1 | V | Calculated motor voltage |
| n7 | DC-link voltage | 1 | V | Measured DC-link voltage |
| n8 | Temperature | 1 | °C | Temperature of the heat sink |

| | | | | |
|---|---|---|---|---|
| n9 | Operating day counter | | DD.dd | Operating days 1), not resettable |
| n10 | Operating hours, "trip counter" | | HH.hh | Operating hours 2), can be reset with program-button #3 |
| n11 | MW-hours | 0,001 | MWh | Total MW-hours, not resettable |
| n12 | MW-hours, "trip counter" | 0,001 | MWh | MW-hours, can be reset with programmable button #4 |
| n13 | Voltage/analog input | 0,01 | V | Voltage of the terminal $U_{in}$+ (control board) |
| n14 | Current/analog input | 0,01 | mA | Current of terminals $I_{in}$+ and $I_{in}$- (control board) |
| n15 | Digital input status, gr. A | | | 0 = Open Input, 1 = Closed Input (Active) |
| n16 | Digital input status, gr. B | | | 0 = Open Input, 1 = Closed Input (Active) |
| n17 | Digital and relay output status | | | 0 = Open Input, 1 = Closed Input (Active) |
| n18 | Control program | | | Version number of the control software |
| n19 | Unit nominal power | 0,1 | kW | Shows the power size of the unit |
| n20 | Motor temperature rise | 1 | % | 100%= temperature of motor has risen to nominal value |
| n21 | Option board digital input status | | | 0 = Open Input, 1 = Closed Input (Active) |

**Table 7-1 Monitored Items**

*1) DD = full days, dd = decimal part of a day*
*2) HH = full hours, hh = decimal part of an hour*

### 7.4.2 Parameter Read and Write

The SV9000 variables and parameters can be read and written by using the Parameter Read/Write function.
Profibus parameter according to parameter numbers are as follows.

| Parameter Number | SV9000 parameter group | SV9000 parameter number |
|---|---|---|
| 101 - 199 | Group 1 | 1 - 99 |
| 201 - 299 | Group 2 | 1 - 99 |
| . | . | |
| . | . | |
| 801 - 899 | Group 8 | 1 - 99 |
| 901 - 999 | Profibus DP parameter | |
| 1001 - 1099 | Group 9 | 1 - 99 |
| . | . | |
| . | . | |
| 1901 - 1999 | Group 18 | 1 - 99 |

Numbering of the parameter can be found in the "Fieldbus Application" manual. Parameter ranges and steps are determined also in the "Fieldbus Application" manual, which means that the parameter value should be given without decimals. The Profibus DP parameter group can be set only by the Profibus DP master, not with the SV9000 control panel.

### 7.4.3 Fault Code

When a fault is active, fault codes can be read by using the Parameter Read function. Profibus parameter number according to fault code is as follows.

| Parameter number | SV9000 variable |
|---|---|
| 99 | Active fault code |

List and description of the fault codes can be found in the *USER'S MANUAL*

# 8. FAULT TRACKING

| Fault Type | Possible cause | Checking |
|---|---|---|
| Fault 19 is active in SV9000 | The data cable connection between control board and fieldbus board is not working | Check the installation<br>- if installation is correct contact your Cutler-Hammer distributor |
| Fault 27 is active in SV9000 | Profibus DP Master is not active and the control source is fieldbus | Check the system Master device |
| UL led is not active (Supply Voltage, Green). | The power cable connection between control board and fieldbus board is not working | Check the installation<br>- if installation is correct contact your Cutler-Hammer distributor |
| DE led is active (Data Exchange not Ready) and actual value n22 = 0 | Fieldbus board has not received a parameterization telegram or the telegram is incorrect.<br><br>Bus wire break | Check the configuration in the Profibus DP master.<br><br>Check the bus cables |
| DE led is active (Data Exchange not Ready) and actual value n 22 = 1 | Fieldbus board has not received a configuration telegram or the telegram is incorrect. | Check the type files (GSD) |

# 9. Type Files

## 9.1 GSD-file

```
#Profibus_DP
GSD_Revision        = 1
Vendor_Name         = "Vaasa Control"
Model_Name          = "Vacon CX202OPT"
Revision            = "1.0"
Ident_Number        = 0x9500
Protocol_Ident      = 0
Station_Type        = 0
FMS_supp            = 1
Hardware_Release    = "HW1.0"
Software_Release    = "SW1.0"
9.6_supp            = 1
19.2_supp           = 1
93.75_supp          = 1
187.5_supp          = 1
500_supp            = 1
1.5M_supp           = 1
3M_supp             = 1
6M_supp             = 1
12M_supp            = 1
MaxTsdr_9.6         = 60
MaxTsdr_19.2        = 60
MaxTsdr_93.75       = 60
MaxTsdr_187.5       = 60
MaxTsdr_500         = 100
MaxTsdr_1.5M        = 150
MaxTsdr_3M          = 250
MaxTsdr_6M          = 450
MaxTsdr_12M         = 800
Redundancy          = 0
Repeater_Ctrl_Sig   = 0
24V_Pins            = 0
Implementation_Type = "Profibus for Vacon   "
Freeze_Mode_supp    = 1
Sync_Mode_supp      = 1
Auto_Baud_supp      = 1
Set_Slave_Add_supp  = 0
Min_Slave_Intervall = 20
Modular_Station     = 1
Max_Module          = 4
Max_Input_Len       = 20
Max_Output_Len      = 20
Max_Data_Len        = 40
Modul_Offset        = 0
Fail_Safe           = 1
Max_Diag_Data_Len   = 6
Module = "Vacon PPO 1" 0xF3, 0xF1
EndModule;
Module = "Vacon PPO 2" 0xF3, 0xF5
EndModule;
Module = "Vacon PPO 3" 0xF1
EndModule;
Module = "Vacon PPO 4" 0xF5
EndModule;
```

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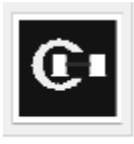

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